

THE UNIVERSITY



OF HONG KONG

*Institute of Mathematical Research  
Department of Mathematics*

## WORKSHOP ON ARITHMETIC GEOMETRY

Thursday, December 5, 2024

Room 210, Run Run Shaw Building, HKU

12:55 – 13:00	Ngaiming Mok (Director of IMR, HKU) <i>Opening remarks</i>
13:00 – 14:00	Colloquium Michael Rapoport, University of Bonn <i>An arithmetic fundamental lemma for the spherical Hecke algebra</i>
<i>Coffee break</i>	
14:30 – 15:15	Felix Schremmer, HKU <i>Towards a dimension formula for affine Deligne-Lusztig varieties</i>
<i>Break</i>	
15:25 – 16:10	Qingchao Yu, Shenzhen University <i>Fibers of level changing map of local model</i>
<i>Break</i>	
16:20 – 17:05	Ryosuke Shimada, HKU <i>On the Supersingular Locus of the <math>GU(2, n-2)</math> Shimura Variety</i>

*All are welcome*

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## Abstracts

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**Michael Rapoport**, University of Bonn

*An arithmetic fundamental lemma for the spherical Hecke algebra*

We formulate an AFL conjecture for the whole spherical Hecke algebra, generalizing Wei Zhang's AFL which concerns the unit element of the spherical Hecke algebra. Even the formulation of the conjecture is non-trivial since a definition of "integral" Hecke operators is needed, a problem that also appears in other contexts. The conjecture can be proved in the first non-trivial case. This is joint work with Chao Li and Wei Zhang.

**Felix Schremmer**, The University of Hong Kong

*Towards a dimension formula for affine Deligne-Lusztig varieties*

Affine Deligne-Lusztig varieties were introduced by Rapoport to study the reduction of Shimura varieties. They have since become an indispensable tool in arithmetic geometry, and are linked to many topics in Lie theory and representation theory.

In this talk, we will revise some of these links, explaining how to combine methods from Deligne-Lusztig theory, quantum algebra, total positivity and Kazhdan-Lusztig theory towards a fuller understanding of the geometry of affine Deligne-Lusztig varieties.

**Qingchao Yu**, Shenzhen University

*Fibers of level changing map of local model*

Local models serve as projective flat schemes that capture the singularities of integral models of Shimura varieties and moduli of  $G$ -Shtukas with parahoric level structures. In this talk, we consider the fibers of the level-changing map between the geometric special fiber of local model with different parahoric levels. We prove that these fibers are always isomorphic to single Schubert varieties in the partial flag variety. This talk is based on a recent joint work with Xuhua He.

**Ryosuke Shimada**, The University of Hong Kong

*On the Supersingular Locus of the  $GU(2, n-2)$  Shimura Variety*

We study the supersingular locus of a reduction at an inert prime of the Shimura variety attached to  $GU(2, n-2)$ . More concretely, we decompose the supersingular locus into a disjoint union of iterated fibrations over (classical) Deligne-Lusztig varieties after taking perfection.